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International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 : A01G 9/10, 27/00, 7/00 — A1

(11) International Publication Number: WO 86/ 05355

(43) International Publication Date: 25 September 1986 (25.09.86)

(21) International Application Number: PCT/EP86/00119

(22) International Filing Date: 7 March 1986 (07.03.86)

(31) Priority Application Numbers: P 35 10 513.3
799,609

(32) Priority Dates: 22 March 1985 (22.03.85)
19 November 1985 (19.11.85)

(33) Priority Countries: DE
US

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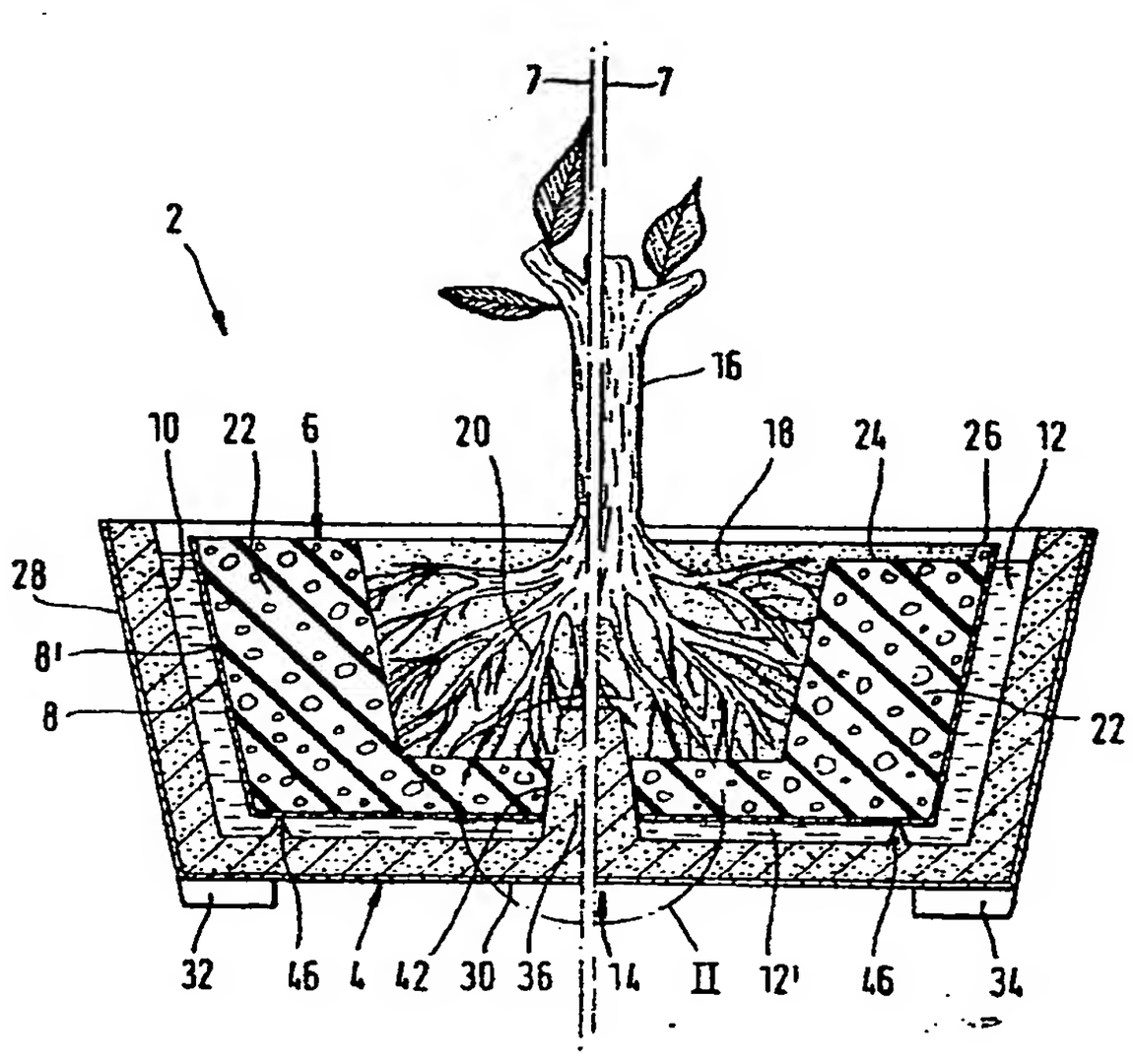
(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A PLANT POT FOR MINIATURE PLANTS

(57) Abstract

The plant pot is used for growing plants with a permanently dwarfed habit and comprises a plant vessel placed in a receiving vessel. The plant vessel is made of a soft, elastic material, such as, for example, soft foam or rubber. The plant vessel has a plant cavity of a suitably reduced size for accommodating nutrient substrate and the root cluster of the plant. To supply the plant with water, a porous component can be provided on a bottom surface of the receiving vessel. The porous component extends into and through an opening in the plant vessel. Water is supplied to the plant vessel from a gap between the receiving and plant vessels, soaks into the porous component and is released therefrom to the nutrient substrate in the plant cavity at a steady, controlled rate. If the soft and elastic material of the plant vessel is capable of absorbing and releasing some water, it may have an external water impermeable coating to avoid escape of water and, if necessary, to prevent the growth of thick roots through the plant vessel.



& ENKE.

1. two containers (ie plant + receiving vessel)

2. lining is foam (but soft elastic — ~6 non permeable)

3. small capacity (20 - 100 cc fill < 2)

4. does not allow water out

5. sealing engagement prevents direct H_2O flow (p7 L 20)

6 water level creates head (p7 L 33)

7. is for bonsai (dwarf)

8. only necessary to keep an eye on water level in gap (p7 L 10)

9. prevents grubbing & soft elastic (cl 4)

Similar

1. porous body extend through wall (p7 L 8-10)

2. sealingly engaging

3. porous body is frustum of cone (p8 L 4)

4. This provides a more reliable seal (p8 L 10)

5. Porous component may be separate (p13 L 23)

6 upper end part extends into cavity (p. 3 L 28)

7. Deformation of passage a liquid tight (p14 L 1)

8 "No of components & ribbon provide (p16 L 8)

A PLANT POT FOR MINIATURE PLANTS

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to plant pots for the cultivation of plants with a dwarfed habit, comprising a plant vessel defining a plant cavity having a volume that is smaller than that required for accommodating nutrient substrate as needed for full growth of the plant.

Description of the Prior Art

A previously proposed plant pot is disclosed in U.S. Patent No. 4,098,021, which relates to a method of limiting the growth of plants by cultivation in very small vessels while preventing convoluted root growth, that is to say, persistent tangential root growth without the formation of sufficiently numerous further fine roots. This patent teaches that such prevention of convoluted root growth is effected by having openings in the wall of the container of such a small size, i.e. a width of 0.05 to 0.3mm, that the growth of plant roots therethrough was at least substantially prevented while, nevertheless, permitting the passage of nutrients to the roots. The container had to be surrounded by the nutrient substance, the intention being for the plant to obtain at least part of the nutrient substances necessary for growth via small root hairs from the surrounding nutrient substance and to thereby refrain from girdling or convoluted growth in search for nutrients elsewhere. However, experience has shown that a size of the openings which substantially prevents the roots from growing through them, is also too small to prevent convoluted root growth such that the roots form convolutions just as if the wall surface did not have any openings therein.

A further shortcoming of this method was that the functional principle disclosed in the patent was dependent on the openings, having a diameter of 0.05 to 0.3 mm, not

becoming clogged. It was therefore necessary to keep a continuous check on the condition of the plant vessel or to clean or replace it when necessary. Furthermore the material had to comply with stringent requirements or there would be a danger of the container bursting prematurely due to the unavoidable growth of the roots with a loss of the growth inhibiting effect. Each container also had to be made of a corrosion-resistant material, preferably stainless steel gauze. Such material is expensive and in some cases difficult to procure.

One approach to solving this problem is to provide a plant pot which has a special internal slotted contour that allows one to cultivate plants with a permanent dwarfed habit, such as so-called bonsai trees. The plant forms roots in a suitable substrate like earth that is provided with water and nutrient substances. The plant vessel, made of porous material such as fired clay for instance, is so placed in an outer receiving vessel for the plant pot that a certain amount of intermediate space is left between the outer surface of the plant vessel and the inner surface of the receiving vessel so that water, with or without dissolved nutrient substances, is filled into the space and penetrates the porous material of the plant vessel to supply moisture to the substrate on the inside of the vessel. The space between the outer surface of the plant vessel and the inner surface of the outer receiving vessel then serves to supply and store moisture and any nutrient substances dissolved therein.

However, it has been discovered that the supply of nutrient substances through the wall of the plant vessel may give rise to certain problems such as, for example, in connection with the supply of nutrient substances through the wall of the plant vessel which is only feasible if the wall of the plant vessel has a very rough porous structure. This limits the choice of materials which can

be used. Furthermore, problems are likely to arise if the pores become clogged. Moreover, there may be a preferential supply of nutrient substance toward the bottoms of any slots present in the wall. Such slots have a particularly small width in the wall separating them from the intermediate space so that there is a local overmanuring or even scorching of the root hairs. It has been found by extensive practical testing that there may be an advantage if the space between the plant vessel and the receiving vessel is only used as a reservoir for water and the nutrient substances are filled directly into the plant cavity, i.e. on top of the substrate rather than from the side. Then there are no longer any restrictions regarding the properties of the material used for the plant pot, as long as it possesses a certain porosity and it is only necessary to ensure a thorough wetting action using the water in the space without having to ensure the transport of nutrient substances through the wall.

It has furthermore been recognized that in cases where plants having a relatively low need for moisture are to be cultivated, as for example, cactuses, or, in cases where there is no danger of the moisture evaporating excessively fast, the water content of a nutrient substance solution introduced from the top is quite sufficient to supply the necessary moisture without any additional supply of water and without the necessity of a water reservoir in the gap. It is then possible to dispense with the complexity of having an additional receiving vessel.

Another previously proposed plant pot system includes a plant vessel which was employed without a receiving vessel, and with a liquid-proof and preferably diffusion-proof cover layer on its outer side surface. Preferably, on its outer bottom face, there is no gap between such cover layer and the wall of the vessel. Such

cover layer, which can be in the form of a glaze, makes it possible for plants with a low moisture requirement, such as cactuses or the like, to be grown satisfactorily, since the moisture, in the form of nutrient substance solution, is supplied directly from above into the particulate substrate.

However, when growing plants with a high moisture requirement, a problem may arise where non-horticulturally minded persons will not acquire the habit of watering regularly and in the right amounts so that the plants will suffer. Furthermore, all the plant pots so far noted herein involve an elaborate process of manufacture, such process being involved in the case of the container made in accordance with the teachings of U.S. Patent No. 4,098,021, since the provision of small openings in steel foil or the like demands the application of special technologies with results that are not always to be precisely predicted.

However, the use of slotted clay vessels or the like, involves a certain complexity in the manufacturing operation if the wall thickness is to be kept small in the area of the slots. It is simplest to produce slots in the material of suitably thick walls that do not follow the slot contour, e.g., with the slots within the thickness of the wall, but this again calls for substantial wall thickness so that in addition to the container being heavy, a large amount of material is needed for producing it.

SUMMARY OF THE INVENTION

Accordingly, one object of the present invention is to devise a plant pot of the type specified herein which is well suited to mass production.

A further object of the present invention is to design such a plant pot that is light in weight.

In order to achieve these and other objects that will appear from the following specification, at least on its inner side, the plant vessel is furnished with a soft, elastic material, such as soft foam, rubber, or the like. Extensive trials have shown that such a soft, elastic material has an effect on the root spread of the plant to be grown which is similar to the slot-like root traps, so that a convoluted or gyrating growth of the roots is successfully prevented and the plant to be cultivated assumes a permanently dwarfed habit. In this respect, the plant vessel may be made entirely of soft, elastic material as a mass produced article at extremely low cost, for instance, with conventional foam molding equipment. Further, the weight of the plant vessel may be kept very low but may be increased to some degree, if desired, to enhance the strength of the plant vessel.

Although it has been proposed in German Published Patent Specification No. 2,434,538 to use a plant pot with a lining of elastic material, as, for example, in the form of an open-celled foam, the intention in that publication is to use a thin, soft foam layer as a lining on the inner face of the plant pot to obtain the fastest and most sturdy growth of a plant to be cultivated with a normal size. The soft foam layer stores water and oxygen as well so that it acts as a reservoir for moisture and oxygen. This German published patent specification teaches this layer to cause the root ends to come to a halt and not grow in convolutions, taking up moisture and oxygen on reaching the open-celled soft foam.

Ours - plus ~~let~~ water in and water out - its pores allow ~~are small~~ enough to ensure high rates of capillary flow

On the other hand, in accordance with the teachings of the present invention, the storage capacity of the soft, elastic material is not important and it may even be water-impermeable.

Further, in accordance with the teachings of the present invention, a plant cavity which is substantially too small for normal plant growth and which is surrounded by a wall of soft, elastic substance that is generally not penetrable by the root hairs, while, at the same time, yielding to them, is provided. Root hairs reaching the soft wall are "confused" by the initial giving way of the soft wall surface and are not caused to move to the side as they would if the wall were firm and non-yielding. Thick roots may possibly penetrate the soft surface without developing root hairs to any great extent but are then trapped in the soft material. Accordingly, in keeping with the object of the present invention, the storage capacity of the open-celled soft foam is not used for storing water and oxygen. Rather the soft, elastic, generally non-water penetrable lining is used for the mechanical property of providing a soft, elastic surface of a peripheral wall of a plant cavity which is not large enough for normal growth of the plant.

Further features of the present invention are defined in the claims.

The soft, elastic material may be at least substantially impermeable to water so that no special measures have to be taken to avoid loss of water; however, the material can have some water storage capability and still provide the "giving way" function.

Furthermore, the soft, elastic material is best located in an impermeable receiving vessel so that the plant pot is surrounded by a robust outer casing and it is possible to have a gap or intermediate space between them able to function as a liquid reservoir, making it possible

for the plant to be watered less often.

In accordance with a further feature of the present invention, it is possible to have means for providing a continuous and rate-adjusted supply of water from the gap into the plant vessel so that the addition of water may be varied to correspond to changing conditions.

The means providing the rate adjusted supply of water may take the form of a porous body extending through the wall of the plant vessel and sealingly engaging same. Water from the gap between the receiving vessel and the plant vessel then makes its way into the porous body, soaks through the porous material thereof, and is released into the substrate of the plant cavity, slowly and continuously. In this respect, the rate of flow of water through the porous body will depend on the absorbent capacity of the substrate in the plant cavity; this means that there is a faster release of moisture from the porous body when the substrate, in which the plant is rooted, is relatively dry and a slower release of moisture from the porous body when the substrate is relatively moist. Due to the sealing engagement between the plant vessel and the porous body at a flow passage, water is kept from flowing directly from the gap into the substrate and swamping or overwatering the plant.

In accordance with a further feature of the invention, the porous body projects from an inner surface of the receiving plant vessel, preferably at its bottom, and may be molded integrally with the receiving vessel. This integral construction of the porous body and the receiving vessel leads to manufacturing advantages, while, on the other hand, the formation of the porous body as a projection involves an increase in the size of the water releasing surface. The arrangement of the projection on the surface of the bottom is advantageous insofar as the water level in the gap creates a liquid head or head

pressure effect at the porous body and enhances the penetration of water into the substrate.

It is furthermore possible to make the porous body in the form of the frustum of a circular cone, this also offering manufacturing advantages, especially with respect to removal of the body from a mold as part of mass production. Furthermore, this design in the form of a frustum of a circular cone facilitates insertion of the plant vessel into the receiving vessel and causes a more reliable seal to be formed between the wall of the plant vessel and the porous body extending through it. It is also possible to provide spacers between the bottom of the receiving vessel and the bottom of the plant vessel so that there is a second gap between the two, this gap also being filled with water so that a part of the peripheral surface of the porous body is constantly surrounded by water, again contributing to an enhanced supply of water to the substrate. This benefit is most appreciated in the case of potted plants with a relatively high moisture requirement.

The receiving vessel may be made of a porous material, more particularly fired clay. This is especially useful if there are no spacers since in such a case, the movement of water from the gap into the porous body may take place only through the porous material of the receiving vessel. It would also be possible for the receiving vessel to be manufactured of resin, this offering advantages with respect to manufacturing costs and weight.

Further details, features and advantges of the plant pot of the present invention will be described in the ensuring description of various embodiments of the plant pot of the present invention in conjunction with the plant pot shown in the drawings.

the 'plug' here conducts water from within - ours conducts water from outside

BRIEF DESCRIPTION OF THE DRAWINGS

FIG 1. is a sectional view taken on the line I-I of FIG. 3 and shows a plant pot made in accordance with the teachings of the present invention viewing the plant pot from the side, the left and right sides of the Figure being different to indicate possible modifications of the plant pot.

FIG. 2 is an enlarged view of the bottom center section of the plant pot shown in FIG. 1 and which is circled in FIG. 1.

FIG. 3 is a top plan view of a plant pot made in accordance with the teachings of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, one embodiment of a plant pot 2 is shown therein and has as its main parts a receiving vessel 4 and a plant vessel 6. The plant vessel 6 is adapted to be so inserted into the receiving vessel 4 that there is a gap or intermediate space 12 between an outer peripheral wall surface 8 of the plant vessel 6 and an inner peripheral wall surface 10 of the receiving vessel 4. This gap 12 provides a space for storing water that is supplied via water supply means 14, which will be explained in greater detail hereinafter, for a plant 16 to be cultivated.

If the material of the plant vessel 6, whose properties significant for the invention will be described later, is permeable to water, it is possible to prevent undesired passage of moisture by having a coating 8', if needed, applied on the side wall surface 8. This coating 8' may be made mechanically strong to form a peripheral wall and a covering for the floor of the pot as well. In particular, when the vessel 6 is mechanically supported on the outside at the surface 8, a coating 8' in the form of a paint or lacquer film will be sufficient. The gap 12 is then not needed if the material of the plant vessel 6 is able to absorb sufficient water and store it; in the simplest case, as, for example, for commercial horticulture, it is sufficient to have the plant vessel 6 alone made of a material that is sufficiently water tight or has a water tight coating thereon.

The plant 16 is rooted in a plant cavity 18, which in the present example, is formed in the middle of the plant vessel 6 and is filled with a suitable solid substrate, such as, for example, clay granules, volcanic ash, sand or the like, in which the plant 16 forms a root cluster 20.

The volume of the plant cavity 18 depends on the

ultimate size which the plant 16 is to reach and will normally be in the range of 20 to 100 cubic centimeters. In FIG. 3 the plant pot is shown by way of example in its natural size.

small size

FIG. 1 shows two possible modifications of the plant vessel 6 by way of example. In the left hand part of FIG. 1, one side wall 22 of the plant vessel 6 has a generally constant cross section. In the right hand side of FIG. 1, the side wall has a step 24 at its top end part, it being possible for this step 24 also to be covered with a substrate from the plant cavity 18 so that only a relatively narrow portion 26 of the side wall 22 is visible. This working example of the plant vessel 6 has a pleasing appearance, especially if the thickness of the side wall 22 is relatively great.

The material used for the manufacture of the receiving vessel 4 will, as a rule, be fired clay, the vessel 4 being provided with a liquid tight or impermeable coating, such as, for example, in the form of a glaze 28. In addition to fired clay, it is possible to use other porous materials, such as, for example, pumice.

It would also be conceivable for the receiving vessel 4 to be fashioned of resin or another non-porous material; however, it is to be borne in mind in this connection that it is then not possible for water to move through such material. If desired, or if necessary, support legs 32 and 34 may be provided on the bottom surface 30 of the receiving vessel 4.

In order to make certain that the plant 16, which is rooted in the plant cavity 18, remains healthy despite the small volume of the plant cavity 18, it is necessary to affect the spread of the root cluster 20 in such a way so as to prevent convoluted growth of the roots along the side or peripheral wall of the plant cavity 18, if the separate roots of the root cluster 20 reach this side wall

during the course of their growth and spread. To this end, the material from which the plant vessel 6 is manufactured, is made so that it is soft and elastic. In the course of extensive investigations it has been found that polyurethane foam and rubber compounds or blends are suitable as materials for the plant vessel 6. During such investigations, experience has shown that the roots of the root cluster 20 stop growing in the course of the radial growth process as soon as the root tips reach the wall of the plant cavity 18, i.e., there is no convoluted growth of the roots, and, it is rather a case of the root cluster 20 forming a mass of fine root hairs on the side wall of the plant cavity 18, such fine root hairs being closely adjacent to the material of the plant vessel 6. This interruption of the growth of the root cluster 20 leads to a permanently dwarfed habit of the plant 16. The reason or reasons for the interruption in the growth of the roots as soon as they come into contact with the material of the plant vessel 6 is not completely clear. However, investigations seem to indicate that the soft and elastic material of the plant vessel 6 "confuses" the roots as soon as they reach this material, since on the one hand there is no irresistible obstacle encountered which would divert the root growth in another direction, while on the other hand the material of the plant vessel 6 is such that it is not penetrated by the root cluster 20. Rather upon engaging and making contact with the rubber or soft, elastic resistance on all sides as part of their natural tendency to radially extend causes the roots to cease to grow. In this respect, it is possible for strong or thick roots to penetrate open-celled soft polyurethane foam, if used, and to come out on the other side; however, the part of the root thread, which is embedded in the soft, elastic material, forms practically no root hairs. If the soft, elastic material is provided with an exterior impenetrable

coating which is applied without any intervening gap, this growth will also halt at the inner side thereof. On the other hand, the tip of the thick root may emerge at the peripheral or side surface 8 and will grow some distance into the surrounding water before the growth is halted. Root hairs will likewise not be formed at the tip, which has penetrated, to any substantial extent, as long as the tip does not come across any nutrient substances but only tap water, for example. The uptake of nutrient substance via root hairs may therefore be limited to the plant cavity 18 and it is possible to ensure that the growth of the plant 16 is limited.

- It is preferred for the material of the plant vessel 6 to be able to take up and release water, but for water not to be able to flow through it due to the presence of the coating 8', and in this way prevent any overwatering of the plant.

As indicated in FIG. 2, a component 36 of porous material, such as, for example, fired clay, is applied to a bottom surface 38 of the receiving vessel 4. The arrangement of the component 36 on the bottom surface 38 may be one in which the component 36 is formed integral with the receiving vessel 4 at its bottom surface 38. As an alternative to this, as marked with a dashed line in FIG. 2, the component 36 may be separate and rest on the bottom surface 38 of the receiving vessel 4.

As shown in FIGS. 1 and 2, the componment 36 extends through the plant vessel 6 in such a way that an upper end part 40 of the component 36 extends into the plant cavity 18. Preferably the component 36 has the form of a frustum of a circular cone or the contour thereof, and a receiving passage opening 42 in the plant vessel 6 has a cylindrical contour so that on insertion of the plant vessel 6 into the receiving vessel 4 (with motion of the component 36 moving through the plant vessel 6 at the passage opening

42) there will be a deformation of the passage opening 42 and therefore a liquid tight engagement of the plant vessel 6 at the passage opening 42 on the component 36.

Still referring to the drawing an account will now be given of the effect of the component 36 in connection with the plant vessel 6 in more detail.

First, the plant vessel 6 is inserted into the porous receiving vessel 4 so that the component 36 extends through the plant vessel 6 by way of passage opening 42. Next, the plant 16 is put in place and the plant cavity 18 is filled with some suitable substrate. The gap or intermediate space 12 between the side wall 8 of the plant vessel 4 and the side wall 10 of the receiving vessel 4 is filled with water, the gap 12 serving as a reservoir for moisture, which may readily be checked by eye and only occasionally has to be topped off with water. To make it easier to keep a check on the water level in the gap 12 and to facilitate topping off, the plant vessel 6 is made with a recess at one edge so that, as shown in FIG. 3, there is a filling opening 44, in which a water level indicator can be mounted and which is used for topping off the gap 12 with water.

In the illustrated embodiment of the plant pot 2 of the present invention in accordance with FIG. 1 bosses or formations 46, (hereinafter simply spacers 46) are formed on the bottom surface 38 of the receiving vessel 4. The presence of these spacers 46 results in a gap 12' being formed under the plant vessel 6 as well, such gap 12' also being kept full of water.

The material of the plant vessel 6 is, in the case of the present example, either completely or substantially impermeable to water in order to keep the plant cavity 18 from being swamped with water if there is an overly high water level in the gap 12, from it and through the material of the plant vessel 6. The supply of liquid from

the gap 12 or 12' to the plant cavity 18 is by way of the component 36 in such a way that the water coming from the gap 12' penetrates the porous material of the component 36, rises by capillary action or the like in the component 36 and then is discharged from the end part 40 of the component 36 to the substrate in the plant cavity 18 of the root cluster 20, as is diagrammatically indicated in FIG. 2 by the arrows denoting the directions of flow. In this respect, it is especially to be noted that the water supply through the component 36 into the plant cavity 18 depends on the moisture content of the substrate in the plant cavity 18, that is to say, the drier the substrate in the plant cavity 18, the greater the supply of water through the component 36 due to a suction effect of the substrate, and vice versa. Desiccation or overwatering of the plant 16 is thus practically eliminated since the plant 16 is able to draw its water as needed automatically from the gap 12.

Also, the supply of nutrient substances is directly from above, i.e., by the introduction of nutrient substances into the plant cavity 18. In this respect, slow acting manures with an ion-exchange action have proved to be particularly satisfactory, from which the respective nutrient substances are dissolved out by the root secretion of the plant and then absorbed.

It is possible for the illustrated embodiment of the plant pot 2 to be varied to incorporate a number of different modifications and variations all coming within the scope of the present invention, and which will be briefly touched upon hereinafter.

If the plant 16 to be grown has only a low water requirement, it would be possible to dispense with the spacers 46 so that the plant vessel 6 would rest directly on the bottom surface 38 of the receiving vessel 4. The supply of moisture from the gap 12 to the component 36

would then be through the porous material of the receiving vessel 4 in the zone between its bottom surface 38 and the bottom surface 30.

It would furthermore be possible to have two or more components 36, extending through the plant vessel 6 for large plants 16 or plants 16 with a heavy water requirement.

It would also be feasible for the component 36 not to be made integral with the bottom surface 38 of the receiving vessel 4 so that there could be provided a number of components 36, which would have differing degrees of porosity for the purpose of adapting the release of water from the gap 12 or 12' to the plant cavity 18 to meet the respective requirements.

As noted earlier, it is also possible for the receiving vessel 4 to be fashioned of a non-porous material, such as, for example, resin. However, in this respect, it is to be borne in mind that the spacers 46 must be provided in order to make it possible for the water in the gap 12 to make its way through the gap 12' and the component 36 to the plant cavity 18.

It is also possible for the shape of the receiving vessel 4 and of the plant vessel 6, respectively, to be other than rectangular as shown in FIG. 3. The receiving vessel 4 may also be circular, oval or have some other form pleasing to the eye.

As a further modification, it would be possible to have a number of plant cavities 18 if the receiving vessel 4 and the plant vessel 6 were large enough for this and this plant pot construction would then lend itself to the forming of a floral or foliage arrangement.

Finally, if the receiving vessel 4 is formed of a resin, by e.g. injection molding, the component 36 may be formed integral with the bottom surface 38. In this case, if the resin material used is not a porous material, some sort of passageways, e.g. in the form of ax-

ially extending slits or grooves can be formed e.g. on the outer circumferential surface of the component 36 in order to open a passage for the water from gap 12 or 12' into the plant cavity 18.

In summary, the plant pot 2, as described herein, makes possible the cultivation of plants with a permanently dwarfed habit in an extremely facile and troublefree manner, it only being necessary to keep an eye on the water level in the gap 12 and, if appropriate, to replenish water or the slow acting manure in the plant cavity 18 occasionally. The supply of the plant with the moisture in the form of water as needed for it from the gap 12 is something that takes place continuously and at a controlled rate through the component 36, the supply rate of water to the substrate and the root cluster 20 at any given time being governed by the requirements of the plant in an optimum manner. Thus, there is no risk of the plant drying out or the roots suffering under swampy conditions.

The use of the soft and elastic material for the plant vessel 6 prevents convoluting growth of the roots at a minimum of expense, so that the plant may be kept in a healthy state despite the permanently dwarfed habit.

If the comport 36 controlls the rate of water movement- how can there be enough water for the plant when it exceeds this rate

CLAIMS

1. A plant pot for the cultivation of a plant with a dwarfed growth habit comprising: a plant vessel defining a plant cavity therein, said cavity having a volume less than that needed to accommodate an amount of nutrient substrate sufficient for full growth of said plant, said plant vessel, at least on an inner surface thereof, being made of a soft and elastic material such as soft foam, rubber or the like.

2. The plant pot of claim 1 wherein said soft and elastic material is able to absorb and release water.

3. The plant pot of claim 1 wherein said plant vessel has a coating on an outer surface thereof, said coating being impermeable to water.

4. The plant pot of claim 1 wherein said soft and elastic material is at least substantially impermeable to water.

5. The plant pot of claim 1 further comprising a receiving vessel into which said plant vessel is placed.

6. The plant pot as claimed in claim 5 wherein said soft and elastic material is mechanically supported and held in place cn an outer surface thereof by said receiving vessel.

7. The plant pot of claim 5 comprising spacers placed between a bottom surface of said receiving vessel and a bottom support surface of said plant vessel.

8. The plant pot of claim 5 wherein said receiving vessel is made of a porous material with an impermeable coating on an outer surface thereof.

9. The plant pot of claim 8 wherein said receiving vessel is made of fired clay.

10. The plant pot of claim 5 wherein said receiving vessel is made of synthetic resin.

11. The plant pot of claim 5 wherein said receiving vessel is impermeable to water.

12. The plant pot of claim 5 wherein a filling gap for water is provided between an outer peripheral wall of said plant vessel and an inner peripheral wall of said receiving vessel.

13. The plant pot of claim 12 further comprising at least one supply means for the continuous and rate-controlled supply of water from said gap to said plant cavity.

14. The plant pot of claim 13 wherein said supply means has a water supplying component extending through a wall of said plant vessel and containing passageways for penetration of water therethrough.

15. The plant pot of claim 14 wherein said passageways are in the form of pores in a porous material and/or in the form of channels.

16. The plant pot of claim 14 wherein said water supplying component extends from a buttom surface of the receiving vessel.

17. The plant pot of claim 15 wherein said water supplying component is molded integrally on the receiving vessel.

18. The plant pot of claim 15 wherein said water supplying component has the form of the frustum of a cone.

19. A plant pot for the cultivation of a plant with a dwarfed growth habit comprising: a plant vessel defining a plant cavity therein, said cavity having a volume less than that needed to accommodate an amount of particulate substrate sufficient for full growth of said plant, said plant vessel having an inner surface and an outer surface and comprising, at least on said inner surface thereof, soft and elastic means for preventing encircling, girdling growth of roots by enabling outgrowing roots to engage and move said soft, elastic means and then form small root fibers instead of growing along said inner surface around said vessel and means, at least on said outer surface thereof, for preventing water from permeating through said outer surface.

20. The pot of claim 19 wherein said plant cavity has a volume no greater than 100 cc.

21. The pot of claim 19 wherein said soft and elastic means comprise polyurethane foam.

22. The pot of claim 19 wherein said soft and elastic means comprise rubber.

23. The pot of claim 19 wherein said soft and elastic material is able to absorb and release water.

24. The pot of claim 19 wherein said soft and elastic material is at least substantially impermeable to water.

25. The pot of claim 19 further comprising a receiving vessel into which said plant vessel is placed.

26. The pot of claim 25 wherein said soft and elastic material is mechanically supported and held in place on an outer surface thereof by said receiving vessel.

27. The pot of claim 25 comprising spacers placed between a bottom surface of said receiving vessel and a bottom support surface of said plant vessel.

28. The pot of claim 25 wherein said receiving vessel is made of a porous material with an impermeable coating on an outer surface thereof.

29. The pot of claim 28 wherein said receiving vessel is made of fired clay.

30. The pot of claim 25 wherein said receiving vessel is made of synthetic resin.

31. The pot of claim 25 wherein said receiving vessel is impermeable to water.

32. The pot of claim 25 wherein a filling gap for water is provided between an outer peripheral wall of said plant vessel and an inner peripheral wall of said receiving vessel.

33. The pot of claim 32 further comprising at least one supply means for the continuous and rate-controlled

supply of water from said gap to said plant cavity.

34. The pot of claim 33 wherein said supply means has a water supplying component extending through a wall of said plant vessel and containing passageways for penetration of water therethrough.

35. The pot of claim 34 wherein said passageways are in the form of pores in a porous material and/or in the form of channels.

36. The pot of claim 34 wherein said water supplying component extends from a buttom surface of the receiving vessel.

37. The pot of claim 35 wherein said water supplying component is molded integrally on the receiving vessel.

38. The pot of claim 35 wherein said water supplying component has the form of the frustum of a cone.

39. The plant pot of claim 19 wherein said plant vessel is impermeable to nutrient substances.

40. The plant pot of claim 19 wherein said particulate substrate is volcanic ash.

41. The plant pot of claim 19 wherein said particulate substrate is sand.

42. The plant pot of claim 19 wherein said particulate substrate is clay granules.

43. The plant pot of claim 19 wherein said means for preventing water penetration comprises a paint.

44. The plant pot of claim 19 wherein said means for preventing water penetration comprises a laquer film.

45. The pot of claim 19 wherein said means for preventing water penetration comprises a glaze.

46. A plant pot for the cultivation of a plant with a dwarfed habit comprising: a thick walled plant vessel having a small plant cavity therein, said cavity having a small volume relative to the volume of the plant vessel, said cavity volume also being less than that needed to accommodate an amount of particulate substrate sufficient for full growth of said plant, said plant vessel being

made of a soft elastic material, and a layer, on an outer surface of said thick walled plant vessel, made of a water impermeable substance.

47. The plant pot of claim 46 further comprising a receiving vessel having a cavity with a volume larger than the volume of said plant vessel, said plant vessel being received in said receiving vessel, means for maintaining said plant vessel separated from said receiving vessel to create a space therebetween, and liquid supply means communicating said space with said plant vessel cavity for providing a continuous and rate controlled supply of liquid from said space to said plant vessel cavity.

48. A method for culturing a plant with a dwarfed habit comprising the steps of: providing a plant vessel having a plant cavity which is diminutive in size as compared to the dimension of a cavity required for full growth of a plant; preventing girdling and encircling growth of plant roots in said cavity by providing said plant vessel with a soft elastic thick wall facing and forming said cavity such that roots of a plant while growing will engage and move said wall and then form small root fibers; placing a small plant and particulate substrate within the plant cavity of the plant vessel with roots of the plant fanned out within the cavity; providing liquid communication means through said plant vessel; providing liquid in a rate controlled manner in said cavity through said liquid communication means; and providing nutritive substances to the plant by dispersing same into the upper surface of the particulate substrate in the plant vessel within which the plant is rooted.

FIG. 1

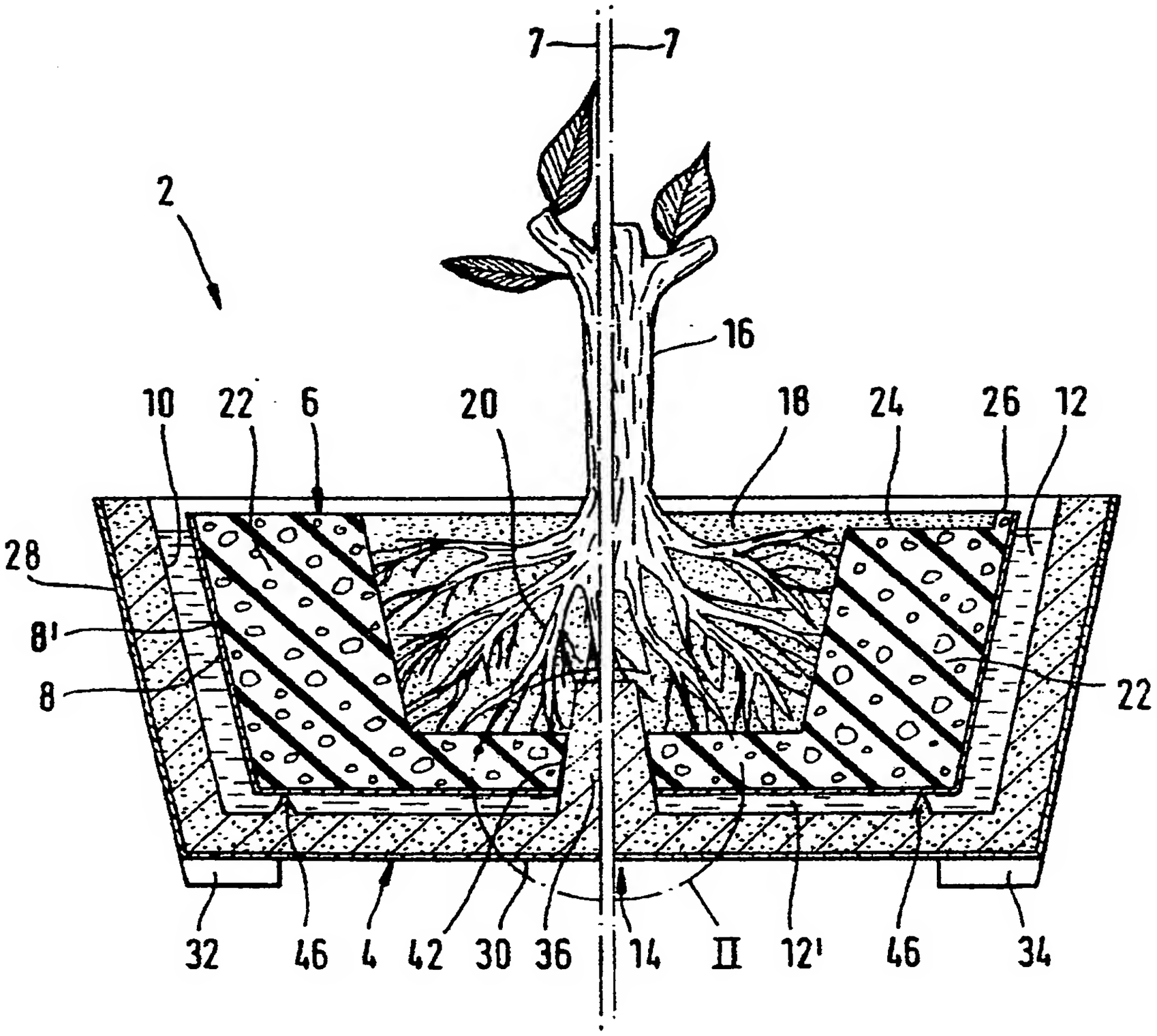


FIG. 2

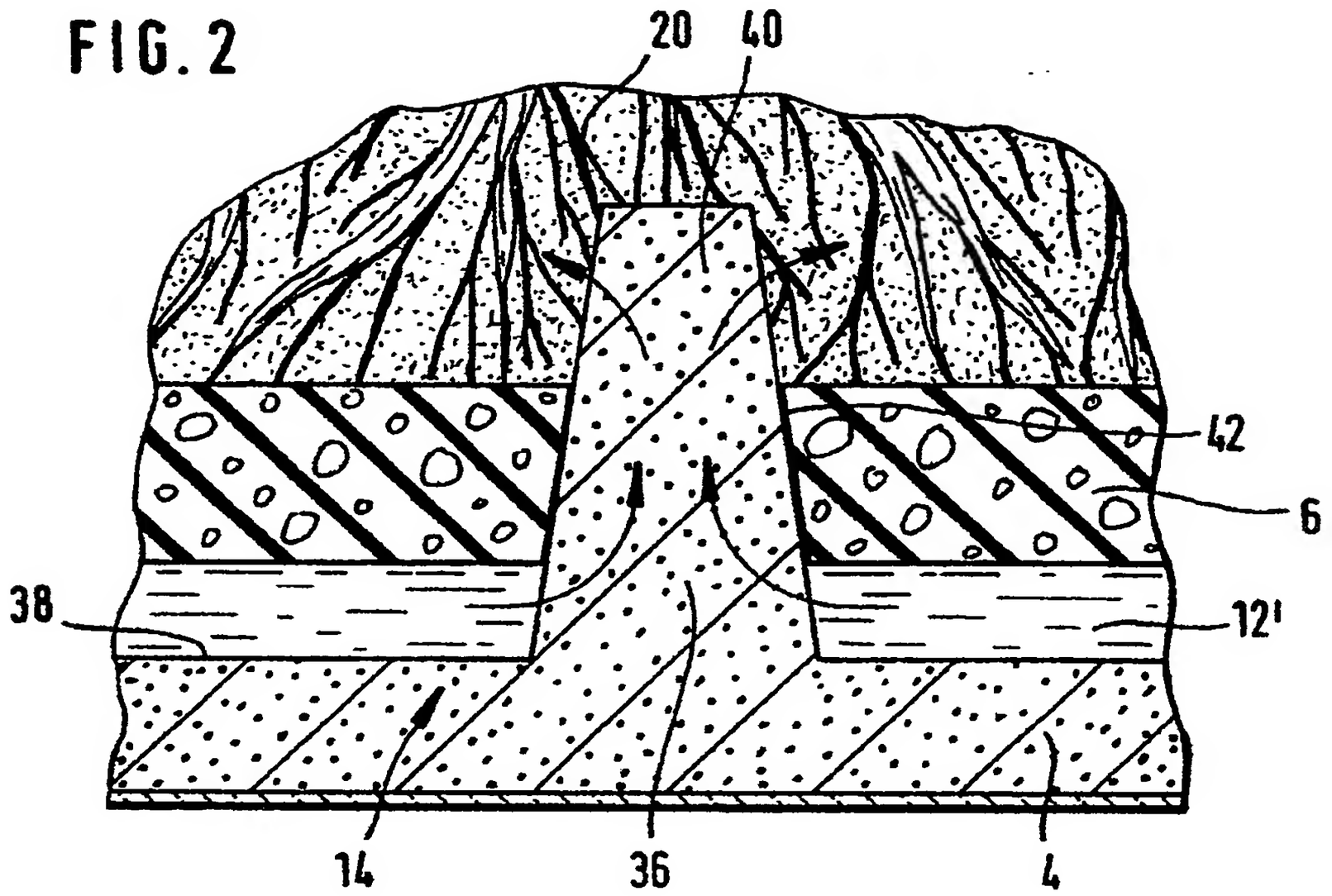
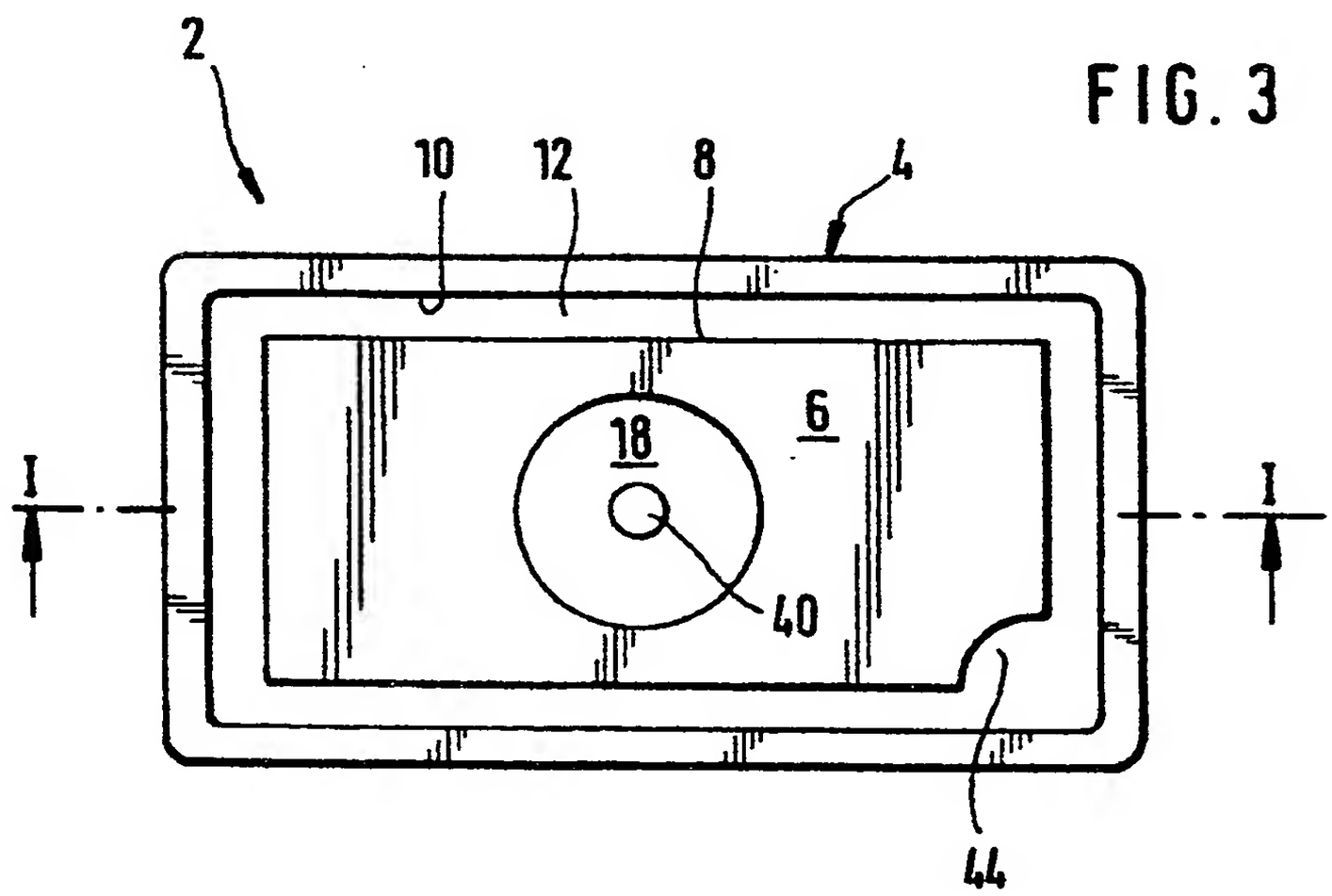


FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 86/00119

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: A 01 G 9/10; A 01 G 27/00; A 01 G 7/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	A 01 G

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	WO, A, 82/03530 (FARWEST BOTANICALS INC.) 28 October 1982, see page 4, line 16 - page 6, line 20; claims 1-3,10,12,13; figures 1,3-6	1-4,19,22-24,39-42,46
Y	DE, A, 2744143 (GRUBER) 5 April 1979, see claims 1,3,4,7,8,13-15; figures 4-6	1-4,19,22-24,39-42,46
A		48
Y	FR, A, 2237568 (YAMASHITA & NISHI) 14 February 1975, see figures 2,4; page 8, lines 7-16; page 8, line 31 - page 10, line 29; claims 1,3,4 & DE, A, 2434538 (cited in the application)	19,22-24, 39-42
A	FR, A, 1263364 (BERANGER) 2 May 1961, see the whole document	5-7,11-16, 25-27,31-36, 47,48
A	DE, U, 7605394 (VAN BREEMEN) 16 June 1976, see figure 1; claim 1; page 5, line 10 - page 6, line 9 ./.	8,9,17,18, 28,29,37,

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
7th July 1986	11 AUG 1986
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	M. VAN MOL

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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		38,43-45
A	US, A, 4221752 (BRAY) 9 September 1980, see abstract; figure 1; column 3, lines 56-61	10,11,30,31
A	DE, B, 2602107 (GRUBER) 31 March 1977, see claim 1; column 4, line 4 - column 6, line 3; figure 5 & US, A, 4098021 (cited in the application)	1,5,19,20, 25
A	CH, A, 409507 (PROPLASTO AG) 15 October 1966, see claim 1; sub-claim 1; lines 11-14; page 1, lines 40-60	21-24
A	BE, A, 899372 (ONAY) 31 July 1984, see figure 1; page 2	5,6,10-16, 25,26,30-36

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/EP 86/00119 (SA 12885)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 15/07/86

The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A- 8203530	28/10/82	AU-A-	8529282	04/11/82
		US-A-	4420903	20/12/83
DE-A- 2744143	05/04/79	None		
FR-A- 2237568	14/02/75	NL-A-	7409680	21/01/75
		DE-A-	2434538	13/02/75
		JP-A-	50029325	25/03/75
FR-A- 1263364		None		
DE-U- 7605394		None		
US-A- 4221752	09/09/80	None		
DE-B- 2602107	31/03/77	BE-A-	850340	02/05/77
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		AU-B-	518494	01/10/81
		JP-A-	59091819	26/05/84
		CA-A-	1172043	07/08/84
CH-A- 409507		None		
BE-A- 899372	31/07/84	None		